

**Amendments to the Claims:**

The listing of claims will replace all prior versions, and listings, of claims in the application:

**Listing of Claims:**

**CLAIMS**

What is claimed is:

- 1 - 4. (Canceled)
5. (Currently Amended) A method for detecting defects in microfabricated structures having repetitive and non-repetitive regions, the method comprising:
  - a. acquiring contrast data from the microfabricated structures;
  - b. analyzing automatically the contrast data to find repetitive regions of the contrast data;and
  - c. comparing the repetitive regions of the contrast data with reference data to detect defects in the microfabricated structures;

wherein the analyzing step includes creating at least one X-direction one-dimensional profile of a cell-metric of the contrast data and at least one Y-direction one-dimensional profile of the cell-metric of the contrast data and thresholding the at least one X-direction one-dimensional profile and the at least one Y-direction one-dimensional profile to find the repetitive regions in the contrast data.
6. (Original) The method of claim 5, wherein the reference data are repetitive cells in the repetitive regions.
7. (Original) The method of claim 5 further comprising finding non-repetitive regions in the contrast data and comparing the non-repetitive regions of the contrast data with non-repetitive reference data.

8 - 16 (Canceled)

17. (Original) The method of claim 5, wherein the analyzing step includes creating at least two X-direction one-dimensional profiles of a cell-metric of the contrast data and at least two Y-direction one-dimensional profiles of the cell-metric of the contrast data and thresholding the two X-direction one-dimensional profiles and the two or more Y-direction one-dimensional profile to find the repetitive regions in the contrast data.

18. (Original) The method of claim 5, wherein the acquiring contrast data step is performed with an e-beam inspection system.

19. (Original) The method of claim 5 that further comprises reporting defect data of detected defects.

20. (Original) The method of claim 5, wherein the microfabricated structures are on a semiconductor wafer.

21. (Original) The method of claim 5, wherein the comparing step further comprises arbitration comparison of the contrast data with at least two reference data sets.

22. (Original) The method of claim 5, wherein the acquiring step comprises acquiring contrast data with an integer number of pixels across a single repeated cell of the microfabricated structure.

23. (Currently Amended) A method for defect inspection of semiconductor wafers having repetitive and non-repetitive regions, the method comprising:

a. acquiring contrast data from the semiconductor wafer with an e-beam defect inspection system;

b. analyzing the contrast data ~~using a range of the contrast data~~ to find repetitive regions of the contrast data;

c. comparing the repetitive regions of the contrast data with reference data to detect defects and find locations of the defects in the semiconductor wafer; and

d. reporting the locations of the defects;

wherein the analyzing includes creating at least one X-direction one-dimensional profile of a cell-metric of the contrast data and at least one Y-direction one-dimensional profile of the cell-metric of the contrast data and thresholding the at least one X-direction one-dimensional profile and the at least one Y-direction one-dimensional profile to find the repetitive regions in the contrast data.

24. (Currently Amended) A defect inspection system for detecting defects in microfabricated structures having repetitive and non-repetitive regions, the system comprising:

- an XY stage disposed to support the microfabricated structures for inspection;
- a microscope and detector to acquire contrast data of the microfabricated structures;
- an image computer equipped with stored program instructions for processing the contrast data to detect defects in the microfabricated structures, the processing comprising analyzing automatically the contrast data to find repetitive regions of the contrast data and comparing the repetitive regions with repetitive reference data to detect defects in the microfabricated structures; and the analyzing automatically the contrast data includes creating at least one X-direction one-dimensional profile of a cell-metric of the contrast data and at least one Y-direction one-dimensional profile of the cell-metric of the contrast data and thresholding the at least one X-direction one-dimensional profile and the at least one Y-direction one-dimensional profile to find the repetitive regions in the contrast data.

25. (Original) The defect inspection system of claim 24 wherein the microscope is an e-beam-based microscope.

26. (Original) The defect inspection system of claim 24 wherein the reference data are repetitive cells in the repetitive regions.

27 - 30. (Canceled)

31. (Original) The defect inspection system of claim 24 wherein the microscope is an optical microscope.

32. (Original) The defect inspection system of claim 24 wherein the microfabricated structures are on a semiconductor wafer.

33. (Original) The defect inspection system of claim 24 wherein a magnification of the microscope is set to ensure an integer number of pixels of the contrast data across a single repeated cell of the microfabricated structures.

34. (Original) The defect inspection system of claim 24 wherein the processing further comprises analyzing automatically the contrast data to find non-repetitive regions of the contrast data and comparing the non-repetitive regions with non-repetitive reference data to detect defects in the microfabricated structures.

35. (Original) The defect inspection system of claim 24 wherein detected defects are reported.

36. (Currently Amended) A defect inspection system for detecting defects in microfabricated structures having repetitive and non-repetitive regions, the system comprising:

- XY stage means disposed to support the microfabricated structures for inspection;
- microscope means and detector means to acquire contrast data of the microfabricated structures;

- means for processing the contrast data to detect defects in the microfabricated structures, the means for processing comprising means for analyzing the contrast data to find repetitive regions of the contrast data and means for comparing the repetitive regions with repetitive reference data to detect defects in the microfabricated structures.

wherein the means for analyzing the contrast data includes means for creating at least one X-direction one-dimensional profile of a cell-metric of the contrast data and at least one Y-direction one-dimensional profile of the cell-metric of the contrast data and means for thresholding the at least one X-direction one-dimensional profile and the at least one Y-direction one-dimensional profile to find the repetitive regions in the contrast data.

37. (Original) The defect inspection system of claim 36 wherein the microscope means is an e-beam-based microscope.

38. (Original) The defect inspection system of claim 36 wherein the reference data are repetitive cells in the repetitive regions.

39 - 42. (Canceled)

43. (Original) The defect inspection system of claim 36 wherein the microscope means is an optical microscope.

44. (Original) The defect inspection system of claim 36 wherein the microfabricated structures are on a semiconductor wafer.

45. (Original) The defect inspection system of claim 36 wherein a magnification of the microscope means is set to ensure an integer number of pixels of the contrast data across a single repeated cell of the microfabricated structures.

46. (Original) The defect inspection system of claim 36 wherein processing means further comprises means for analyzing the contrast data to find non-repetitive regions of the contrast data and means for comparing the non-repetitive regions with non-repetitive reference data to the detect defects in the microfabricated structures.

47. (Original) The defect inspection system of claim 36 wherein detected defects are reported.